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Article Abstract: First-order nonlinear differential-delay equations describing physiological control systems are studied. The equations display a broad diversity of dynamical behavior including limit cycle oscillation, with a variety of wave forms, and apparently aperiodic or "chaotic" solutions. These results are discussed in relation to dynamical respiratory and hematopoietic diseases.

The two models offered involve the delay in the neural signal to the diaphragm to move in breathing (Cheyny-Stokes respiration) and the delay in the timing of production of new white blood cells in humans. Michaelis-Menton type equations with functional responses are offered in each case.

Plots and parameters are offered for student confirmation of the model activities and "what if" studies and sensitivity studies on parameter changes.

A set of good references is also provided.